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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/857,310	06/01/2001	Johannes Jacobus Van Vaals	PHN 17,651	4882

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05/13/2003

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EXAMINER

FETZNER, TIFFANY A

ART UNIT

PAPER NUMBER

2859

DATE MAILED: 05/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/857,310

Applicant(s)
Johannes Van Vaals

Examiner
Tiffany Fetzner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Apr 30, 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3-5, and 9-12 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-5, and 9-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on Nov 6, 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

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DETAILED IST RCE ACTION

RCE -- 37 CFR 1.114 -- After Final Action

1. A request for continued examination under 37 CFR 1.114 including the fee set forth in 37 CFR 1.17 (e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17 (e) has been timely paid, the finality of the previous Office Action has been withdrawn pursuant to 37 CFR 1.114. Applicant's Submission filed on April 18th 2003 has been entered.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Canceled claims

3. **Claims 2, 6-8 and 13-17 are canceled** as per applicant's April 30th 2003 RCE amendment. As such the rejections concerning these claims are now considered to be moot by the examiner.

Response to Arguments

4. Applicant's arguments filed April 30th 2003 with respect to **claims 1, 3-5, and 9-12** have been considered but are moot in view of the new ground(s) of rejection.

5. ***Drawings***

6. The Proposed red-ink drawing correction to Figure 1 is approved by the examiner. New-formal drawings which include the approved red-ink changes are still needed and required.

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7. *Specification*

8. The objection to the abstract, **has been overcome** by the amendment of November 14th 2002.

9. The objections to the disclosure are **rescinded** because applicant has removed the words "for example", "such as", and "or the like", from the originally filed disclosure.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. **Amended Claims 1, 10 and 12** rejected under **35 U.S.C. 102(b)** as being anticipated by **Darrow et al.**, US patent 5,730,129.

12. With respect to **twice amended MR method Claim 1**, and corresponding **twice amended claim 12** which is simply the computer implementation of **twice amended MR method Claim 1, Darrow et al.**, teaches, shows and suggests "A method of forming a magnetic resonance image of an object to be examined, comprising the steps of: "acquiring magnetic resonance signals", [See col. 3 lines 20-56] "determining the position of a measuring site" [See col. 3 line 60 through col. 4 line 47], "determining a geometrical relationship between the measuring site and the object being examined" [See col. 3 line 5 through col. 6 line 50; Figures 2, 3, and 4], "reconstructing the magnetic resonance image from the magnetic resonance signals and

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on the basis of the position of the measuring site” [See Figures 1, 5, 6, col. 3 line 5 through col. 4 line 47], “reproducing a detail of the object being examined and an indication of the measuring site together in the magnetic resonance image” [See Figures 1 through 6, col. 4 lines 43-68 col. 6 lines 26-44; col. 1 line 58-col. 2 line 47 col. 1 lines 15-18; abstract] and deriving a correct position of the detail of the object being examined in the magnetic resonance image relative to the indication of the measuring site on the basis of the position of the indication of the measuring site and the determined geometrical relationship between the measuring site and object being examined.” [See abstract, col. 1 line 6 through col. 6 line 50, Figures 1 through 6].

13. With respect to the limitation of **twice amended claim 12** that the MR image of the object is formed by a computer program with instructions for implementation, **Darrow et al.**, teaches, and suggests this limitation because **Darrow et al.**, teaches that imaging device 20 has an imaging interface 123 and imaging electronics 121 which are considered to inherently include at least one computer processor, because in the MRI / NMR diagnostic imaging art conventionally all the calculations to form an image are computer controlled, and imaging interfaces unless otherwise stated contain the computer commands to execute a particular imaging sequence or method.

14. With respect to twice amended **Claim 10**, **Darrow et al.**, teaches, shows and suggests “A magnetic resonance imaging system for forming a magnetic resonance image of an object to be examined comprising: a coil system for acquiring magnetic resonance signals and for determining the position of a measuring site” [See col. 3 lines 31-59], “a unit” (i.e. the tracking units and position detection means taught throughout the reference) “for the determination of a geometrical

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relationship between the measuring site and the object being examined” [See col. 3 line 60 through col. 6 line 50, Figures 1 through 6 especially figures 2, 3, and 4]. and “a reconstruction unit” (i.e. registration unit 160) “for the reconstruction of the magnetic resonance image from the acquired magnetic resonance imaging signals and the position determined for the measuring site, the reconstruction unit being arranged to reproduce a detail of the object being examined and an indication of the measuring site together in the magnetic resonance image”, [See col. 3 line 60 through col. 6 line 50, Figures 1 through 6 especially figures 2, 3, and 4], and “a correct position of the detail or the object being examined in the magnetic resonance image relative to the indication of the measuring site being derived on the basis of the position of the indication of the measuring site and the determined geometrical relationship between the measuring site and the object being examined.” [See col. 4 line 49 through col. 6 line 50 Figures 1 through 6].

15. ***Claim Rejections - 35 USC § 103***

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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18. **Claims 3-4** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Darrow et al.**, US patent 5,730,129. as applied to **claim 1** above, and further in view of **Schneider et al.**, US patent 5,711,300.

19. With respect to **Amended Claim 3**, **Darrow et al.**, teaches and suggests “deriving a reference magnetic resonance image from the reference magnetic resonance signals, deriving a measuring magnetic resonance image from the measuring magnetic resonance signals, and “making the measuring magnetic resonance image and the reference magnetic resonance image to register on the basis of the position determined for the measuring site (ie., one or more reference points of subject 100 over time, that are being imaged).” [See col. 2 line 20 through col. 6 line 50; figures 1 through 6, and the abstract.]

20. **Darrow et al.**, lacks teaching or suggesting the limitations of “acquiring a set of measuring magnetic resonance signals at a reference temperature”, and acquiring a set of measuring magnetic resonance signals after the temperature has been changed, notably increased, at the area of the measuring site”, However, **Schneider et al.**, teaches “acquiring a set of measuring magnetic resonance signals at a reference temperature, acquiring a set of measuring magnetic resonance signals after the temperature has been changed, notably increased, at the area of the measuring site, deriving a reference magnetic resonance image from the reference magnetic resonance signals”, and “deriving a measuring magnetic resonance image from the measuring magnetic resonance signals,” [See **Schneider et al.** col. 6 line 9 through col. 8 line 67; table 2 which shows temperature ranges for the different measurements; col. 1 line 4 through col. 2 line 5]. The examiner notes that because the reference and measurement images, obtain there phase

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difference information, for temperature, at corresponding pixels of the two phase images (i.e. the reference image and the measurement image) the **Schneider et al.**, reference also teaches and or suggests “making the measuring magnetic resonance image and the reference magnetic resonance image to register on the basis of the position (i.e. the corresponding pixels in the excited slice) determined for the measuring site (i.e. the excited slice that represents the region of the patient to be imaged).” [See **Schneider et al.** abstract, col. 6 line 9 through col. 8 line 67; table 2; col. 1 line 4 through col. 2 line 5]

21. It would have been obvious to one of ordinary skill in the art, at the time that the invention was made to modify the MR device and position tracking method of **Darrow et al.**, to include the temperature measurement teachings of **Schneider et al.**, because interventional devices, (i.e. catheters, guide wires, and other devices that are constructed of metallic components will in addition to generating the signals desired, also change in temperature during an invasive MR procedure. The examiner notes that because conventional air temperature in an MRI room is about 22-26 degrees Celsius and a human patient’s internal body temperature is about 37 degrees Celsius it is conventionally expected that the invasive device 150 taught by **Darrow et al.**, would increase in temperature over the duration of the MR procedure disclosed by **Darrow et al.**, therefore, it would have been obvious to one of ordinary skill in the art, at the time that the invention was made to modify the teachings of **Darrow et al.**, to account for the temperature changes of the invasive device as well as the corrections, taught by **Darrow et al.**, with respect to a patient’s respiration and cardiac cycle, because the goal of the **Darrow et al.**, method is to track an invasive device within a patient accurately, while the patient is non-stationary and it is well

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known that a non-stationary patient's internal body temperature is not constant and should be taken into consideration.

22. With respect to **Claim 4, Darrow et al.**, teaches "On the basis of the position determined for the measuring site" (ie., one or more reference points of subject 100 over time, that are being imaged) "acquiring the reference magnetic resonance signals and the measuring magnetic resonance signals from essentially the same region." [See col. 3 line 20 through col. 6 line 50; Figures 1 through 6; abstract]

23. With respect to **Amended Claim 5, Darrow et al.**, teaches and suggests "reproducing a detail and an indication of the measuring site in the reference magnetic resonance image", [See col. 2 line 20 through col. 6 line 8, Figures 1 through 6; abstract] "reproducing the same detail and the indication of the measuring site in the measuring magnetic resonance image" [See col. 2 line 20 through col. 6 line 8, Figures 1 through 6; abstract, especially figures 5 and 6], and that "a shift of the detail is derived from respective positions of the detail relative to the indication of the measuring site in the reference magnetic resonance image and the measuring magnetic resonance image, correcting the position of the detail in the measuring magnetic resonance image on the basis of the derived shift of the detail." [See col. 1 line 6 through col. 6 line 50, Figures 1 through 6].

24. **Amended Claims 9, and 11** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Darrow et al.**, US patent 5,730,129 as applied to **claim 1** above, and further in view of **Rasche et al.**, US patent 5,938,599.

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25. With respect to **Amended Claim 9**, which depends from **twice amended claim 1**, **Darrow et al.**, teaches that “the position of the measuring site is derived from the position magnetic resonance signals.” [See co. 3 lines 32 through col. 4 line 47] **Darrow et al.**, lacks directly teaching or suggesting “a microcoil is used to acquire position magnetic resonance signals at the area of the microcoil, and the position of the measuring site is derived from the position magnetic resonance signals.” However, **Rasche et al.**, teaches determining the nuclear magnetization in the surrounding region of an object by means of a micro-coil which is mounted on the inserted object such as a catheter, and then being able to determine the position of the object from the nuclear magnetization [See abstract] This teaching suggests applicant’s dependent feature since the measured MR signals are determined from the position of the micro-coil within the object, or human subject. It would have been obvious to one of ordinary skill in the art, at the time that the invention was made, that the teachings of **Darrow et al.**, are both modifiable and combinable with the teachings of **Rasche et al.**, because the **Darrow et al.**, reference teaches that the invasive device may be a guide wire a catheter, an endoscope, a laparoscope, a biopsy needle or similar device, and the examiner considers the microcoil of **Rasche et al.**, to be a “similar device” to the **Darrow et al.**, reference.

26. With respect to **Amended Claim 11**, **Darrow et al.**, teaches that “the reconstruction unit is arranged to derive the magnetic resonance image from the magnetic resonance signals on the basis of the position magnetic resonance signals.” [See col. 3 line 60 through col. 6 line 50]. **Darrow et al.**, lacks directly teaching or suggesting use of “a microcoil for the acquisition of position magnetic resonance signals at the area of the microcoil”. However, **Rasche et al.**,

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teaches and suggests this limitation for the same reasons as those given in the rejection of **amended claim 9** which need not be reiterated. The same reasons for rejection, that apply to **twice Amended claim 1**, and the reasons for obviousness, and motivation to combine that apply to **Amended claims 9**, also apply to **Amended claim 11**.

27. The **prior art made of record** and not relied upon is considered pertinent to applicant's disclosure.

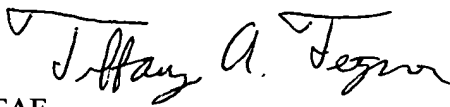
A) **Ishihara et al., US patent 5,378,987** which shows an invasive MRI device where temperature changes inside the patient are tracked.

Conclusion

28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Tiffany Fetzner** whose telephone number is **(703) 305-0430**. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

29. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Diego Gutierrez**, can be reached on **(703) 308-3875**. The fax phone number for the organization where this application or proceeding is assigned is **(703)305-3432**.

30. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is **(703) 305-0956**.


TAF

May 9, 2003


Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800